Argonne NATIONAL LABORATORY

ALH: Alarm Handler

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U.S. DEPARTMENT OF ENERGY

What is the Alarm Handler?

- An interactive graphical application used primarily by accelerator operators and physicists to display and monitor EPICS database alarm states.

Purpose of the Alarm Handler

- Bring alarms to the operator's attention
- Provide the operator with guidance on handling specific alarms
- Allow the operator to globally acknowledge alarms
- Provide a graphical view of current database alarms
- Log alarms and operator actions, and display the logged alarm history

What is an alarm?

- Deviations from tolerance band
  - Major: red alarm. Significantly out of tolerance or a fault
  - Minor: yellow alarm. Moderately out of tolerance or a warning
- Software or Hardware errors
- Loss of communication to hardware or linked records

Severity and Status

- There are two parts to an alarm:
  - the alarm status, and
  - the severity of that alarm status.
- Alarm status and severity are set and checked whenever a record is processed.

Severity and Status

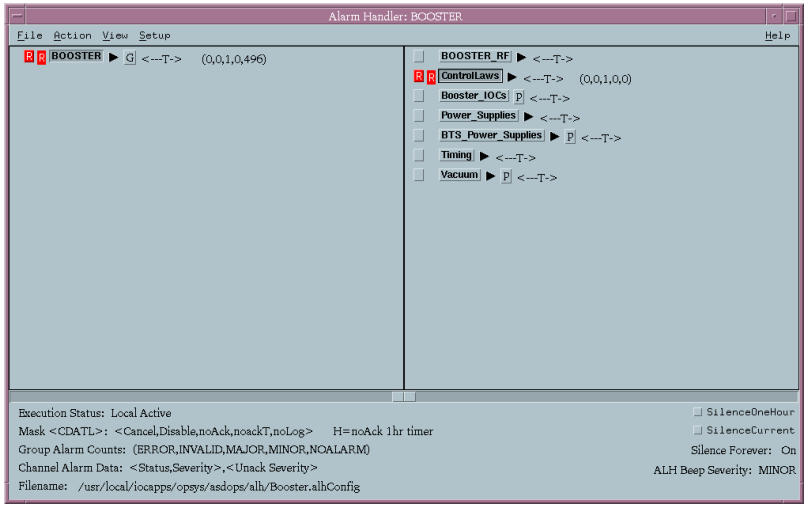
- Alarm Severity
  - The SEVR alarm field of an EPICS record gives the severity of its alarm condition.
  - The alarm severity can take one of four values:
    - NO_ALARM: The record is not in alarm. The pv has returned to a normal state
    - MINOR: Yellow alarm. This is the lowest alarm severity.
    - MAJOR: Red alarm. This is the second highest severity condition.
    - INVALID: White alarm. Invalid data or no communication. This is the highest severity condition.

Severity and Status

- Each record has a STAT alarm field that holds the current alarm state of the record, i.e. what caused the record to go into alarm
- The state field can take one of more than 20 values, some of which are:
  - HIHI
  - HIGH
  - LOW
  - LOLO
  - STATE
  - READ
  - WRITE
  - LINK

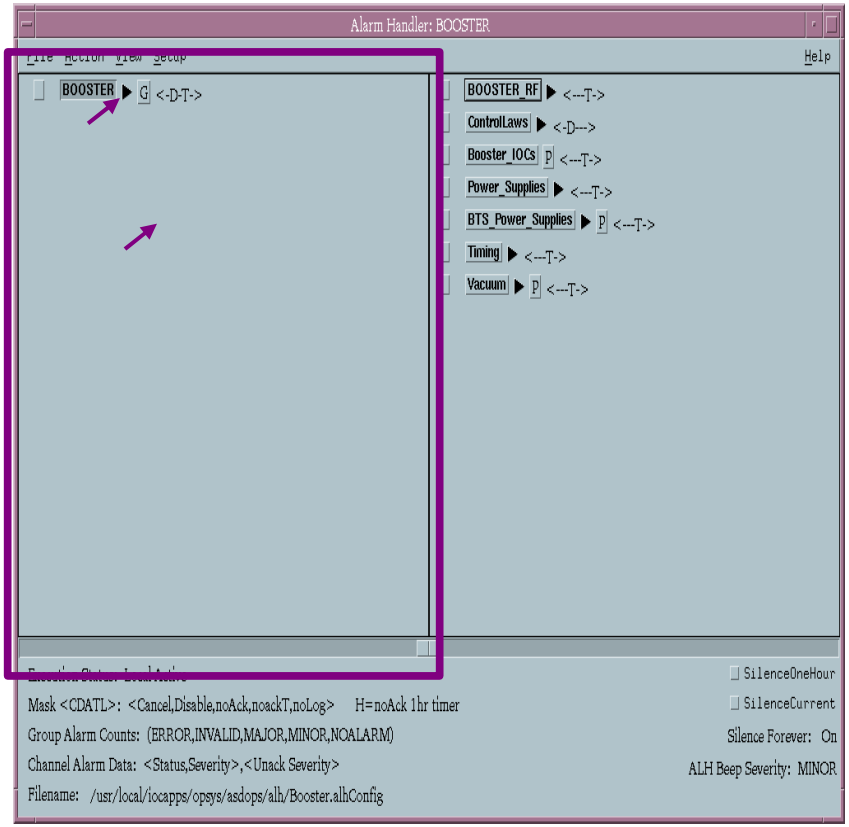
ALH Runtime Window

- The runtime window contains a single button with the name of the main Alarm Group for the alarm configuration loaded.
- The color of this button shows the highest alarm severity of any outstanding alarms.
- Beeping and blinking of the button is used to show the presence of unacknowledged alarms.
- Pressing the runtime window button will open the Alarm Handler Main Window or, if already open, bring the Main Window to the top of the window stack.



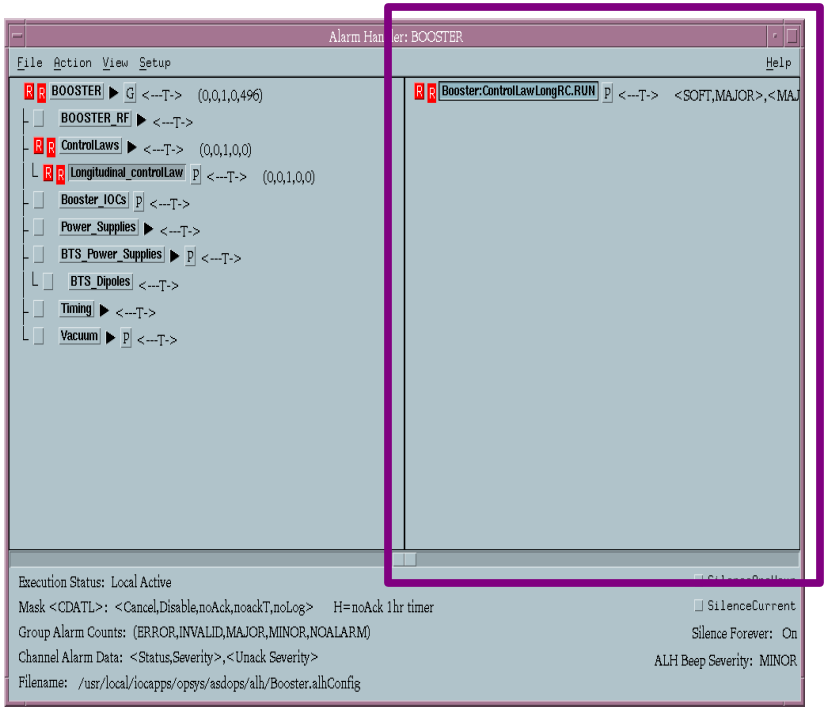
Configuration Tree Structure Area

- Displays groups of alarms in a tree structure. Selecting any group will cause that group's contents to be displayed in the group contents area to the right
- Clicking on a triangular button will expand/collapse that branch. The order in which the groups are listed in the configuration file sets the order they will appear in the tree structure



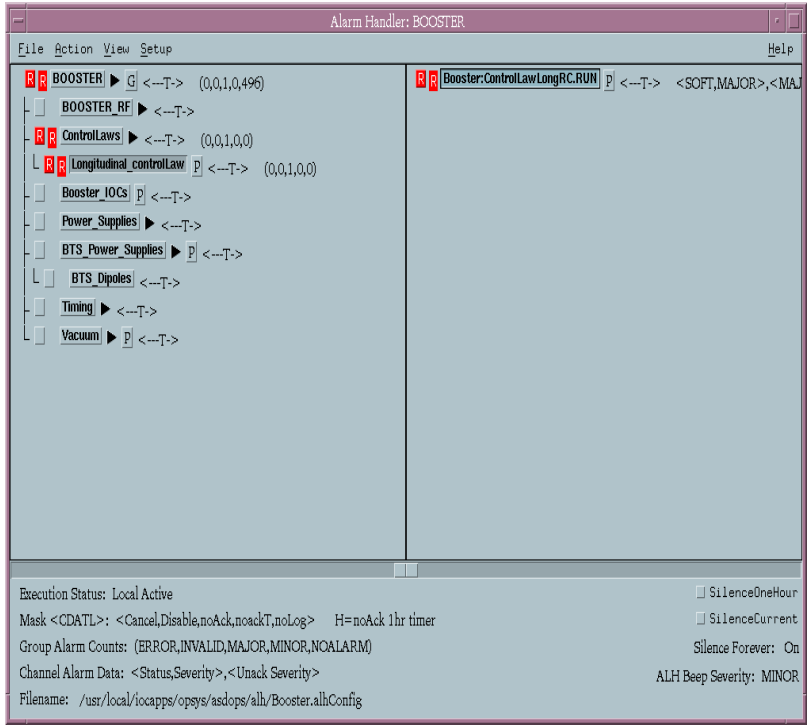
Group Contents Area

- The Group Contents Area displays the contents of the group currently selected in the configuration tree
- Individual PVs are not shown in the configuration tree, they only appear in the Group Contents Area



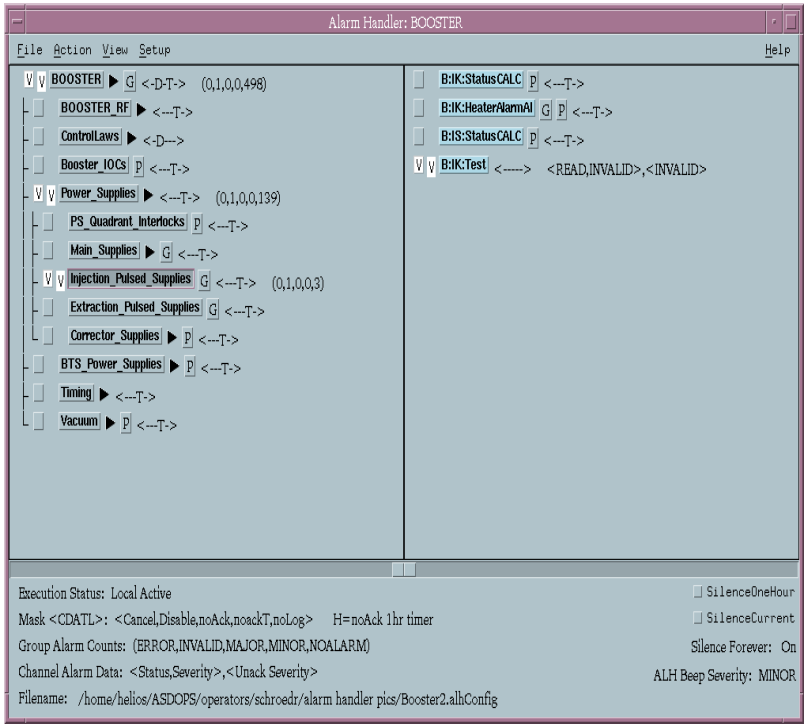
Alarm Detail

- Alarms are displayed in both areas as two adjacent colored squares
- The left square is a button for acknowledging alarms, and shows the highest unacknowledged alarm severity for the group
- The right square shows the current IOC alarm state for the group
- Acknowledging the alarm clears the left square, but only the IOC can change the right square by removing the alarm status



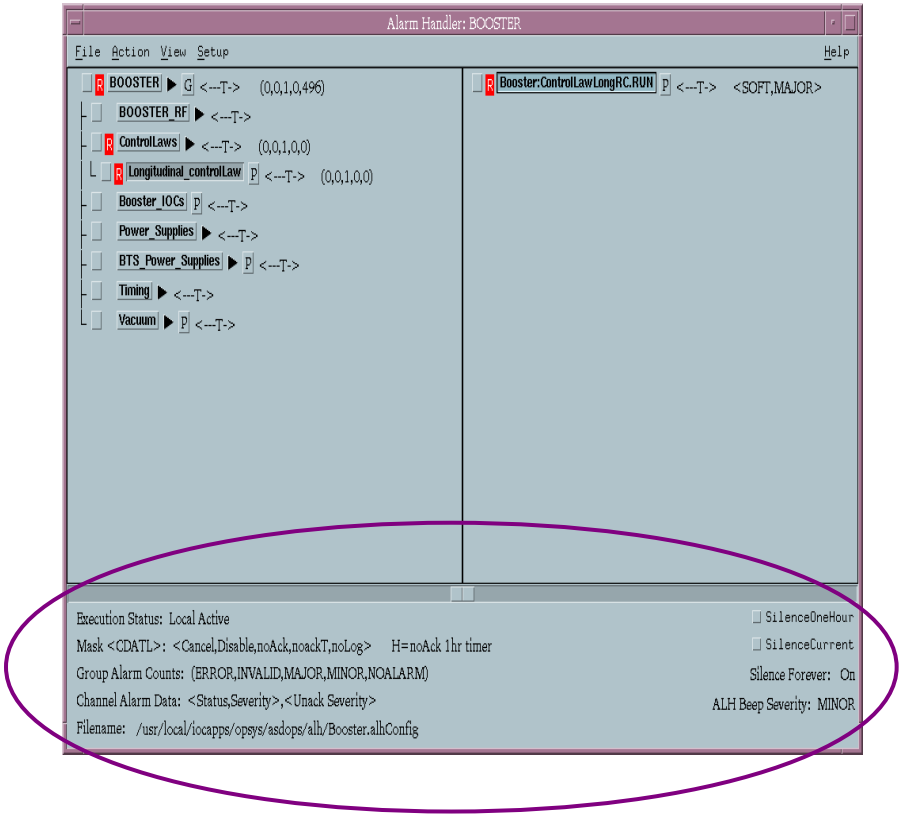
Alarm Severity Colors

- Active and unacknowledged alarms are displayed using a color code:
  - White for INVALID alarms
  - Red for MAJOR alarms
  - Yellow for MINOR alarms
  - The background color for no alarm



Message Area

- At the bottom of the main window is the message area, which acts like the legend of a road map
- It has a key showing what the mask symbols stand for, gives group alarm counts, beep severity, and channel alarm data
- It also shows which configuration file is loaded, and has buttons to silence ALH for one hour or to silence all the current alarms



Alarm Masks

- A Mask is a set of 5 true/false settings that are user definable and displayed as string of 5 characters. They tell the alarm handler how the alarms for each channel should be handled.
- The Mask settings can include any or all of the following:
  - **C**ancel: If set, the ioc will not send alarm information to ALH for this PV
  - **D**isable: ALH will not beep or display alarms from this PV
  - no**A**ck: No acknowledgment is needed; ALH will flash but not beep
  - noack**T**: Acknowledgment is not required if the alarm clears first. Without this, cleared alarms continue to beep until acknowledged
  - no**L**og: If set, ALH will not record the alarm in the log file

Masking Alarms

- Each alarm group and individual PV may have an alarm mask configured
- While running, operators can change the alarm mask for any group or PV
- A mask can also be set automatically based on the value of another PV, or even several other PVs
  - For example: alarms from unused parts of the machine can be disabled

Related Files

- Alarm Handler Configuration File
  - *name*.alhConfig
  - Created by an EPICS application developer, or at some sites by Operations staff
  - Defines the alarm groups and PV channels to be included and the order in which they appear in the tree structure
  - Defines how alarms will be displayed and how users need to interact with those alarms
  - Alarm handler always reverts to the settings defined in the configuration file when the runtime window is launched

Related Files (Continued)

- Alarm Handler Alarm Log File
  - ALH-default.alhAlarm
  - File where all alarm events will be recorded
  - Will log events for all launched alarm handlers in the same file if the the default file is used
- Alarm Handler Operator Modification file
  - ALH-default.alhOpmod
  - File where all changes to the alarm handlers will be recorded (e.g., changes to masks, changes to beep severity, etc.)
  - Will log events for all launched alarm handlers in the same file if the the default file is used